Claims

1. A transmission system including first and second rotatable shafts, and means for transferring drive from one of the shafts to the other shaft including first and second gear wheels each rotatably mounted on the first shaft and having drive formations formed thereon, a selector assembly for selectively transmitting torque between the first shaft and the first gear wheel and between the first shaft and the second gear wheel, wherein the selector assembly includes an actuator assembly and first and second sets of engagement members that are moveable into and out of engagement with the first and second gear wheels independently of each other, said selector assembly being arranged such that when a driving force is transmitted, one of the first and second sets of engagement members drivingly engages the engaged gear wheel, and the other set of engagement members is then in an unloaded condition, wherein the actuator assembly is arranged to move the unloaded set of engagement members into driving engagement with the unengaged gear wheel to effect a gear change.

2. A transmission system according to claim 1, wherein selector assembly is arranged such that when a braking force is transmitted the first set of engagement members drivingly engages the engaged gear wheel, and the second set of engagement members is in an unloaded condition, and when a driving force is transmitted the second set of engagement members drivingly engages the engaged gear wheel, and the second set of engagement members is then in an unloaded condition.

3. A transmission system according to claim 1 or 2, wherein the actuator assembly is arranged to bias the loaded set of engagement members towards the unengaged gear wheel without disengaging the loaded set of engagement members from the engaged gear wheel.

4. A transmission system according to any one of the preceding claims , wherein the first and second sets of engagement members are arranged to rotate, in use, with the first shaft.

5. A transmission system according to any one of the preceding claims, wherein the first shaft is an input shaft and the second shaft is an output shaft and drive is transferred from the input shaft to the output shaft.

6. A transmission system according to any one of the preceding claims, wherein the selector assembly is arranged such that when the first and second sets of engagement members engage one of the first and second gear wheels the backlash when moving between acceleration and deceleration is less than or equal to four degrees.

7. A transmission system according to any one of the preceding claims, wherein the drive formations on the first and second gear wheels comprise first and second groups of dogs respectively.

8. A transmission system according to claim 7, wherein the first and second groups of dogs each comprise between two and eight dogs, evenly distributed on the first and second gears respectively.

9. A transmission system according to claim 8, wherein the first and second groups of dogs each comprise between two and four dogs, and preferably three dogs.

10. A transmission system according to any one of the preceding claims, wherein the first and second sets of engagement members comprise between two and eight members.

11. A transmission system according to claim 10, wherein the first and second sets of engagement members comprise between two and four members, and preferably three members.

12. A transmission system according to any one of the preceding claims, wherein the first shaft includes keyways arranged such that the first and second sets of engagement members can slide axially along the keyways and to radially restrain the positions of the sets of engagement members.

13. A transmission system according to claim 12, wherein the cross-section of the keyways is one of T-shaped, slotted, and dovetailed.

14. A transmission system according to any one of the preceding claims, wherein the actuator assembly includes at least one resiliently deformable means arranged to move at least one of the first and second sets of engagement members into engagement with the first and second gear wheels when the engagement members are in unloaded conditions.

15. A transmission system according to claim 14, wherein the at least one resiliently deformable means is arranged to bias at least one of the first and second sets of engagement

members towards the first or second gear wheel when the engagement members are drivingly engaged with a gear wheel.

16. A transmission system according to claims 14 or 15, wherein the actuator assembly includes first and second resiliently deformable means connected to the first and second sets of engagement members respectively such that the first resiliently deformable means acts on the first set engagement members and the second resiliently deformable means acts on the second set engagement members.

17. A transmission system according to claims 14 or 15, wherein the at least one resiliently deformable means is connected to the first and second sets of engagement members such that the resiliently deformable means acts on both the first and second sets of engagement members.

18. A transmission system according to claim 12 to 17, wherein the members of the first and / or second sets of engagement members can perform limited axial movement relative to each other in the keyways.

19. A transmission system according to any one of claims 12 to 18, wherein the resiliently deformable means is a spring, and preferably a disc spring.

20. A transmission system according to any one of claim to 19, wherein the disc spring includes a plurality of arms, each arm having a first part that extends circumferentially around a portion of the disc spring and a second part that extends substantially radially inwards.

21. A transmission system according to any one of claims 13 to 20, wherein the actuator assembly includes a fork that is arranged to engage the at least one resiliently deformable means to move the at least one radially deformable means axially along the first shaft.

22. A transmission system according to any one of the preceding claims, wherein the drive formations are arranged such that they do not extend beyond the outside diameter of the gear wheels.